Remarks

The above Amendments and these Remarks are in reply to the Office Action mailed Jan. 12, 2005. Claims 1-29, 34, and 39-41 were pending in the Application prior to the outstanding Office Action. Claims 30-33, 35-38 were previously withdrawn. In the Office Action, the Examiner rejected claims 1-29 and 34.

The present Response amends claims 1, 2, 5-14, 17-20, 28, 29, 34, and 39-41, leaving for the Examiner's present consideration claims 1-29, 34, and 39-41. Reconsideration of the rejections is respectfully requested.

I. Restriction and/or Election

In an earlier Office Action mailed July 23, 2004, Examiner withdrew claims 39-41 from further consideration as being drawn to a nonelected species there being no allowable generic or linking claim.

As explained in an earlier response on Oct. 28, 2004, Applicant believes that claims 39-41 are also readable thereon the elected species upon electing the species of "a method for shaping an optic," and therefore respectfully requests them not being withdrawn from further consideration.

II. Claim Rejections - 35 USC § 102

1. Claims 1-20, 22, 23, 25, 26, 28, 29 and 34 were rejected under 35 U.S.C. §102(a) as being anticipated by *Böhm et al.* in DE 199 25 790 A1 (hereinafter, *Böhm*).

As detailed in Applicant's Response on Oct. 28, 2004 to prior Office Action on July 23, 2004, the claimed invention of reactive atom plasma processing (RAPP) in independent claims 1 and 34 are distinguishable from *Böhm* in the following important ways:

- The function of the torch. *Böhm* uses the torch as a microwave antenna to create the plasma discharge (in the field of the antenna). In contrast, the torch in RAPP is primarily used to control the flow of gases and the flow of gas determined by the torch geometry has a strong effect on the stability of the plasma discharge.
- The way the discharge creates the reactive species. *Böhm* uses the electromagnetic (EM) field radiated by a microwave antenna to create the reactive species directly from a precursor. In

contrast, RAPP utilizes the energy of the radio frequency (RF) power source to create and sustain a plasma discharge in a plasma gas (e.g. Argon). The RF energy is transferred to the precursor that subsequently fragments into the reactive species primarily through collisions between the electrons/Argon ions and the precursor. Compared to *Böhm*, such transfer can take place well out of the range of the EM field developed by the RF source and it can excite a wider range of precursors due to its thermal nature. In addition, the efficiency of energy transfer is greater and more consistent.

Examiner noted that "the features upon which Applicant relies are not recited in the rejected claim(s)" (Response to Arguments). Applicant accepts Examiner's comments and has revised claim 1 and 34 to definitely state that the plasma torch "is operable to control a flow of a plasma gas and a flow of precursor into the plasma torch", and reactive atom plasma processing can "transfer energy from a radio frequency (RF) power source to excite the flow of the precursor in the plasma torch" and "sustain a plasma discharge through collisions between the excited flow of the precursor and the plasma gas."

Since claims 2-20, 22, 23, 25, 26, 28, and 29 depend on claim 1, *Böhm* cannot anticipate claims 1-20, 22, 23, 25, 26, 28, 29 and 34, and Applicant respectfully requests that the rejection with respect to these claims be withdrawn.

2. Claims 1-3, 5-9, 12, 14, 20, 22, 25, 29 and 34 were rejected under 35 U.S.C. §102(b) as being anticipated by *Zarowin et al.* in "Rapid Non-contact, Damage Free Shaping of Optical & Other Surfaces with Plasma Assisted Chemical Etching," 43rd Annual Symposium on Frequency Control, 1989, pages 623-626 (hereinafter *Zarowin*).

As detailed in Applicant's Response on Oct. 28, 2004 to prior Office Action on July 23, 2004, the Plasma Assisted Chemical Machining (PACE) method taught in *Zarowin* does not utilize a plasma torch as in RAPP and it suffers the following disadvantages that RAPP is able to overcome successfully:

- A major limitation of capacitively-coupled discharge method like PACE is the requirement that the workpiece be either conductive or less than 10 mm thick. In addition, etch rates are dependant on part thickness, decreasing by a factor of ten when thickness changed from 2 to 10 mm, and are too low to be of much use when thickness is above 10 mm. In addition, the convergence rate for PACE is also typically very low, resulting in a long, expensive multi-

step process.

- While the parts polished by PACE have shown no evidence of subsurface damage or surface contamination, it has been found that greater sub-surface damage present before etching resulted in an increased roughness after etching.
- Devices fabricated from heat sensitive components and heterogeneous materials are typically difficult to polish by PACE purely by chemical means.
- Since the precursor is introduced around the edge of the excitation zone under typical configuration of PACE, it often leads to direct exposure of the electrodes and plasma contamination.
- As a low-pressure plasma system, PACE does not exhibit a smoothing effect since it is unable to establish a relatively high concentration of species in the plasma and a local equilibrium across the boundary layer.

Therefore, *Zarowin* cannot anticipate independent claims 1 and 34. Since claims 2-3, 5-9, 12, 14, 20, 22, 25, and 29 depend on claim 1, *Zarowin* cannot anticipate claims 1-3, 5-9, 12, 14, 20, 22, 25, 29 and 34, and Applicant respectfully requests that the rejection with respect to these claims be withdrawn.

III. Claim Rejections - 35 USC § 103

1. Claim 24 was rejected under 35 U.S.C. §103(a) as being unpatentable over *Böhm* as applied to claim 1 and further in view of U.S. Patent 5,961,772 issued to *Selwyn*.

Selwyn teaches an atmospheric-pressure plasma jet that can be operated near room temperature. "Unlike plasma torches" (Abstract), it shows distinct non-thermal characteristics. Since it does not utilize either a plasma torch nor intend to shape a surface of a workpiece, it cannot anticipate the RAPP in claim 1. As previously discussed, *Böhm* cannot anticipate the RAPP in claim 1, so neither *Böhm* nor *Selwyn* can anticipate the RAPP in claim 1. Since claim 24 depends on claim 1, claim 24 cannot be rendered obvious under 35 U.S.C. § 103(a), and Applicant respectfully requests that the rejection with respect to claim 24 be withdrawn.

2. Claims 19 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Zarowin* as applied to claim 1 and further in view *Selwyn*.

As previously discussed, neither *Zarowin* nor *Selwyn* can anticipate the RAPP in claim 1. Since claims 19 and 24 depend on claim 1, they cannot be rendered obvious under 35 U.S.C. §

103(a), and Applicant respectfully requests that the rejection with respect to claims 19 and 24 be withdrawn.

3. Claim 21 was rejected under 35 U.S.C. §103(a) as being unpatentable over *Böhm* as applied to claim 1 and further in view of U.S. Patent No. 4,674,683 issued to *Fabel*.

Fabel teaches a plasma flames gun with adjustable ratio of radial and tangential plasma gas flow. It does not intend to shape a surface of a workpiece nor utilize a plasma torch, so it cannot anticipate the RAPP in claim 1. As previously discussed, *Böhm* cannot anticipate the RAPP in claim 1, so neither *Böhm* nor *Fabel* can anticipate the RAPP in claim 1. Since claim 21 depends on claim 1, claim 21 cannot be rendered obvious under 35 U.S.C. § 103(a), and Applicant respectfully requests that the rejection with respect to claim 21 be withdrawn.

4. Claims 19 and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over *Zarowin* as applied to claim 1 and further in view *Fabel*.

As previously discussed, neither *Zarowin* nor *Fabel* can anticipate the RAPP in claim 1. Since claims 19 and 24 depend on claim 1, they cannot be rendered obvious under 35 U.S.C. § 103(a), and applicant respectfully requests that the rejection with respect to claims 19 and 24 be withdrawn.

5. Claim 27 was rejected under 35 U.S.C. §103(a) as being unpatentable over *Böhm* as applied to claim 1 and further in view of U.S. Patent No. 6,105,534 issued to *Siniaguine et al.* (hereinafter, *Siniaguine*).

Siniaguine teaches treatment of substrates placed on two carrousels using a plasma jet. It does not intend to shape a surface of a workpiece nor utilize a plasma torch, so it cannot anticipate the RAPP in claim 1. As previously discussed, *Böhm* cannot anticipate the RAPP in claim 1, so neither *Böhm* nor *Siniaguine* can anticipate the RAPP in claim 1. Since claim 27 depends on claim 1, claim 27 cannot be rendered obvious under 35 U.S.C. § 103(a), and applicant respectfully request that the rejection with respect to claim 27 be withdrawn.

6. Claim 27 was rejected under 35 U.S.C. §103(a) as being unpatentable over *Zarowin* as applied to claim 1 and further in view of *Siniaguine*.

As previously discussed, neither *Zarowin* nor *Siniaguine* can anticipate the RAPP in claim 1. Since claim 27 depends on claim 1, claim 27 cannot be rendered obvious under 35 U.S.C. § 103(a),

and Applicant respectfully requests that the rejection with respect to claim 27 be withdrawn.

Conclusion

In light of the above, it is respectfully submitted that all of the claims now pending in the subject patent application should be allowable, and a Notice of Allowance is requested. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

Date: 2/11/05

By: _____

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